motor area was removed from one hemisphere. The entire motor surface comprises the region just described in the previous cases, plus the *gyrus marginalis*. The degenerations observed were quite similar to those described as following the removal of the external motor area, except that they were more complete. In the internal capsule, the degeneration includes the layer adjacent to the optic thalamus. In the crusta and pons it was more complete. In the medulla the pyramid was entirely degenerated, and in the spinal cord the entire crossed pyramidal tract was degenerated, the part bordering on the direct cerebellar tract as completely as the rest. The degeneration passes to the level of the fourth lumbar nerve. So far as these results bear on the *gyrus marginalis*, they show the plus of degeneration in this last group to be equivalent to the entire degeneration where this gyrus alone is destroyed, the two sets of observations thus harmonizing in a satisfactory manner. No definite statement is made in the appendix concerning the side of the cord in which the degeneration of the crossed pyramidal tract occurs. It is to be presumed, however, that the bulk of degeneration is on the side opposite to that of the lesion, while to some extent it occurs on the same side. No degeneration has ever been observed in the anterior columns of the cord in the monkey, and from this the author concludes that the decussation at the pyramids is complete. Since, however, the degeneration occurs in both crossed pyramidal tracts, it would seem to indicate that though no pyramidal fibers found their way to the anterior columns, yet the crossing was incomplete. Aside from the interesting point that the dorsal and lateral portion of the crossed pyramidal tract contains the bulk of the fibers from the *gyrus marginalis*; that these same have a distinct path through the internal capsule and other portions of the axis; and that there is no degeneration in the anterior columns of the spinal cord, there is the very striking result that the *gyrus fornicatus*, which is not connected with motion, but is connected with sensation, causes, on its removal, a descending degeneration, and that this degeneration follows the path of the crossed pyramidal tracts. As Schäfer points out, it is very difficult to bring this degeneration with such a direction and track into harmony with the current views of the relation of the nerve fiber to the cell, and the direction in which degeneration of sensory fibers takes place. The solution of the contradiction is left for further investigation.

(In the rabbit, at least, and probably in man, the cerebral cortex is represented in the thalamus, a portion of the thalamus degenerating in correspondence with the part of the cortex removed, e. g. primary optic centers. This gives the motor cortex at least a double connection with the lower centres, and though these fibers degenerate from above downwards, there is much reason to consider them as sensory, and the results obtained by France from the study of the *gyrus fornicatus* serves to increase the probability of such a view. REV.)

On Neurokeratin. W KÜHNE and R. H. CHITTENDEN. New York Medical Journal, Feb. 22 and Mar. 1, 1890.

In the first paper, Neurokeratin is defined as the constituent of the peripheral and central nervous systems, which is insoluble in alcohol, ether, gastric and pancreatic juice, and dilute caustic potash. The substance was first described by Kühne some thirteen years ago, and since that time has been much discussed by histologists, its existence being doubted by some, while certain parts of the nerve fiber were by others identified with it, one argument against it being that it was an artefact developed by the action of the alcohol and ether. That objection seems now to be answered by the fact that it can be equally well obtained, whether the specimen be first treated with alcohol and ether

and then digested, or the order be reversed. Five analyses were made. No. 1, for example, gives:

C.,	56.11
H.,	7.33
N.,	14.32
S.,	1.88
Ash,	1.21

Neurokeratin, therefore, does not contain phosphorus; and sulphur is the most variable constituent, the percentage in one analysis reaching 2.24. Compared with keratin from the hair of a rabbit, it also shows a decided difference in composition, principally in sulphur, which in the keratin, reaches 4.02. An interesting point is, that the examination of the central nervous system of the lobster showed the analogous insoluble substance to consist of chitin. A study of the quantitative distribution of neurokeratin shows the white matter of the brain to be richest in it, and to have some nine times as much as either the gray matter or the peripheral nerves. The second contribution treats of the histological detection of neurokeratin, pointing out some of the differences between the frog, fish and mammals (rabbits), and concluding that the double sheath joined by cross bands which is found after the treatment of the nerve fibers, represents the neurokeratin framework of the sheath of Schwann, the axis cylinder sheath and the medullary substance.

(The paper is very valuable from the full descriptions of all methods used—something which was much needed. The statements as to the structures which may represent the neurokeratin in the cortex, and the white matter of the central nervous system are, however, suggestive rather than conclusive. REV.)

Ueber eine neue Färbungsmethode des centralen Nervensystems und deren Ergebnisse bezüglich des Zusammenhangen von Ganglienzellen und Nervenfasern. PAUL FLECHSIG. Archiv f. Physiologie, Heft 5 und 6, 1889. 1 Tafel.

The plate accompanying this short communication is very instructive. The difficulty with the cells, as brought out by Golgi's method, has been heretofore that no connection between them and the medullated fibers was demonstrated. In this case, specimens treated by Golgi's bichloride of mercury method were further treated with an extract of Japanese redwood, ("*Japanischer Rothholz*"—further information as to what plant is meant by this commercial term is not given). For the details of the method, which is complicated, the reader is referred to the original. By the treatment the nerve fibers are all colored red, the cells and their prolongations being black, and where the prolongation of a nerve cell goes over into a nerve fiber, it can in these specimens often be followed. The tissues investigated were bits of human cortex from about the central and the calcarine fissures. The general conclusions arrived at were: 1. That the protoplasmic prolongations were not found in connection with nerve fibers. 2. The axis cylinder in most cases branches; it often forms a T, similar to that of the cells of the spinal root ganglia. These branches of the first order may divide again, forming as many as eight subdivisions. Such cells are only from the calcarine region. There is, therefore, a marked distinction between the methods of branching in the two regions examined. 3. The fine network formed by the subdivision of the axis cylinder of cells of the second category (Golgi, Nansen) is not brought out by this method. 4. The fibers forming the superficial and middle horizontal plexuses in the cortex arise from neighboring cells by branches that leave the axis cylinder at right angles.